

REMARKS

This paper is submitted in response to the Office Action mailed April 25, 2003.

Following this amendment, claims 1-12 are pending. Claims 13-24 have been cancelled. Claim 10 has been amended to place the claim in correct independent form. No new matter added as a consequence of the amendments made herein.

Applicant would like to thank the Examiner for withdrawing all 102 and 103 rejections from the Office Action mailed July 31, 2002.

Restriction Requirement

Pending claims 1-12 correspond to Group I of the two groups set forth by the Restriction Requirement mailed July 31, 2002. The Examiner has made final the restriction requirement and stated that a complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action. In response, Applicant has cancelled nonelected claims 13-24.

Applicant reserves the right to continue prosecution of the non-elected claims in a divisional application.

The Rejections under 35 U.S.C. § 102(e) Should Be Withdrawn**Araki et al. (U.S. 6,177,503)**

Claims 1-6, 8 and 11 are rejected under 35 U.S.C. § 102(e), as allegedly anticipated by U.S. Patent No. 6,177,503 to Araki et al. ("Araki") as allegedly evidenced by U.S. Patent No. 6,191,205 to Micouin et al. ("Micouin").

Applicant respectfully traverses these rejections. For a claim to be anticipated by a reference, "there must be no difference between the claimed invention and the reference

disclosure, as viewed by a person of ordinary skill in the field of the invention." *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565 18 U.S.P.Q.2d 1001 (Fed. Cir. 1991). Moreover, a claim is anticipated and fails to meet the requirement of §102 only when a single prior art reference discloses each and every element of the claimed invention. *Lewmar Marine, Inc. v. Bariant*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987), emphasis added.

The present invention

The present invention relates to tire treads usable in tires bearing heavy loads comprising a cross-linked rubber composition comprising (a) an elastomeric matrix comprising a diene elastomer having at one or more of its chain ends a functional group which is active for coupling to a reinforcing white filler; (b) a reinforcing filler comprising a reinforcing white filler in at least 50% by weight of total reinforcing filler; and (c) a reinforcing white filler/functionalized diene elastomer bonding agent.

In contrast to the present invention, Araki does not disclose a rubber composition comprising an elastomeric matrix comprising a diene elastomer having at one or more of its chain ends a functional group, which is active for coupling to a reinforcing white filler. Applicant disagrees with the Examiner's contention that Araki's disclosure of a copolymer "treated by coupling at chain ends with a coupling agent" anticipates the claimed invention (Office Action, paragraph 6, lines 1-2 at page 5). Araki discloses rubber compositions comprising copolymers having ends which may be functionalized for coupling to carbon black, but not reinforcing white filler. The specification only lists various coupling agents, such as tin tetrachloride (SnCl_4), which can only be used for coupling to carbon black. As is well known to one of skill in the art, SnCl_4 is a starring agent which does not couple directly to carbon black,

but generates elastomeric radicals in situ which are reactive with carbon black. There is no teaching or suggestion in Araki to one of skill in the art that the suggested agents can be used to functionalize the chains ends of the diene elastomer for coupling to a reinforcing white filler. Therefore, Araki fails to teach each and every claim limitation of independent claim 1 as it fails to teach or suggest diene elastomers having at one or more of its chain ends a functional group which is active for coupling to a reinforcing white filler. As such, for at least this reason, Araki does not anticipate claims 1-3, 6 and 8 of the present invention.

Similarly, dependent claims 4 and 5 requires the elastomers to have at one or more ends thereof a functional group which is active for coupling to a reinforcing white filler. Applicant disagrees with the Examiner's contention that an "end group with silicon chloride or alkoxy silane when hydrolyzed is equivalent to end group with silanol for sol-gel condensation" can anticipate the claimed invention (Office Action, paragraph 6, lines 3-5, page 5). As stated above, the coupling agents provided in Araki are not used to functionalize the chain ends of the diene elastomer active for coupling to a reinforcing white filler. For this reason, claims 4 and 5 are not anticipated by Araki.

Furthermore, Araki's composition is directed toward a rubber composition for use in passenger cars. In contrast, the present invention is directed to rubber compositions in a tire suitable for bearing heavy loads. Araki has nothing to do with the problem of delaying irregular wear connected with heavy-vehicle tire treads. Thus, for this additional reason, Araki does not anticipate claims 1-6, 8 and 11.

With regard to Micouin, Applicant disagrees with the Examiner's contention that Micouin discloses "materially the same diene rubber composition..." (Office Action, paragraph 5, line 2 at

page 5). Micouin teaches the use of a very specific silica having a BET area of between 185 and 250 m²/g and a CTAB of between 180 and 240 m²/g. (Micouin, col. 2, lines 19-20). In contrast, Araki is not limited to a silica having a specific surface area. In fact, suggested examples of silica which are listed in Araki exhibit specific surface area lower than 180 m²/g. (Araki, col. 6, line 62 to col. 7, line 2). Therefore, Applicant submits that the required silica for Micouin is contrary to the silica taught by Araki and the two cited references do not teach the same rubber composition. Thus, the Examiner cannot rely upon Micouin with regard to the claimed limitations of heavy load bearing vehicle tires and delay of appearance of irregular wear.

For the foregoing reasons, Applicant submits that Araki, as evidenced by Micouin, cannot anticipate claims 1-6, 8 and 11 and requests the withdrawal of the rejection of the claims.

Micouin et al. (U.S. 6,191,205)

Claims 1-3 and 6-9 are rejected under 35 U.S.C. § 102(e), as anticipated by U.S. Patent No. 6,191,205 to Micouin et al. Applicant respectfully disagrees.

Micouin concerns a rubber composition for heavy load bearing tires directed to reducing rolling resistance without compromising other desired properties for the tires. To achieve these goals, the rubber composition of Micouin requires very specific silica having a BET area of between 185 and 250 m²/g and a CTAB of between 180 and 240 m²/g. (Micouin, col. 2, lines 19-20).

Applicant disagrees with the Examiner's contention that Micouin discloses a diene rubber composition made from end group functionalized diene copolymer. Micouin does not specify the diene polymer, which may be a homopolymer or a copolymer, nor a method of synthesizing the diene polymer. In fact, the diene polymer is not necessarily coupled or functionalized. It is

merely mentioned in the specification that the diene polymer may be "coupled and/or starred or else functionalized with a coupling agent and/or starring or functionalizing agent." (Micouin, col. 8, lines 48-50). The composition in the example (Test 1) utilized a diene polymer which does not comprise any functional groups which may be active with silica (col. 10, lines 36-4). Although the control composition (Test 2) does incorporate the silica disclosed by the present invention (Zeosil 1165), it is the undesired control composition. Thus, Micouin teaches away from the presently disclosed composition. Micouin fails to disclose a diene elastomer having at one or more of its chain ends a functional group which is active for coupling to a reinforcing white filler.

Furthermore, the composition taught by Micouin is intended for use in road tires for passenger vehicles. In contrast, the present invention is directed to rubber compositions in a tire suitable for bearing heavy loads. Micouin does not address the problem of delaying irregular wear connected with heavy-vehicle tire treads. Thus, for this additional reason, Micouin does not anticipate claims 1-3 and 6-9.

For the foregoing reasons, Applicant submits that Micouin cannot anticipate claims 1-3 and 6-9 and requests the withdrawal of the rejection of the claims.

The Rejections under 35 U.S.C. § 103(a) Should Be Withdrawn

Claims 1-12 have been rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. 5,871,597 to Vasseur et al. ("Vasseur") in view of Araki et al. The Examiner alleges, *inter alia*, that Vasseur discloses a rubber composition for the crown reinforcement of a tire comprising a diene copolymer, silica filler, silane coupling agent of the presently claimed

invention. The Examiner acknowledges that Vasseur does not teach or suggest using the cross-linked rubber composition for a tire tread. However, the Examiner alleges that Araki teaches a rubber composition that can be made from an endgroup functionalized diene copolymer, silica filler, and a specific silane coupling agent for use in a tire tread. The Examiner contends that both Vasseur and Araki disclose materially the same diene-based rubber composition and that it would be obvious to one of skill in the art to apply Vasseur's cross-linked diene rubber composition for making a tire tread as taught by Araki.

Applicant disagrees. To establish a *prima facie* case of obviousness, three basic criteria must be met (MPEP 2142). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine the teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on Applicant's disclosure. *In re Vaeck* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1981). In addition, the prior art reference(s) must teach or suggest all the claim limitations. Both the suggestion and a reasonable expectation of success must be present in the references themselves.

The Cited Art Does Not Provide a Motivation to Combine

Vasseur discloses a rubber composition for a crown reinforcement exhibiting a reduced rolling resistance for use in any type of tire. The invention relates to the selection of a very specific silica of low surface area. In fact, the silica disclosed by Vasseur exhibit BET and CTAB surface areas that are lower than or equal to 125 m²/g, preferably Zeosil 85MP (CTAB =

60 m²/g and BET = 83 m²/g). (See column 2, lines 45-59; column 3, lines 29-33). Absent from Vasseur is a discussion of a method of delaying irregular wear in tire treads in tires bearing heavy loads comprising preparing by thermomechanical working a rubber composition and forming the tire tread from the rubber composition, as presently claimed. Because the forces placed on a tire during rolling is different from the forces imposing irregular wear of a tire, one of skill in the art would not look to a reference such as Vasseur, which is directed to the problem of rolling resistance, if motivated by the desire to build a tire promoting the delay of irregular wear.

In contrast to Vasseur, Araki concerns a rubber composition for use in passenger tires having improved workability, shrinkage and abrasion resistance. These properties have little to do with rolling resistance or delaying irregular wear on tires. In addition, Araki teaches the use of silica, preferably having a N2SA specific area greater than 125 m²/g, for example, Zeosil 1165MP, Zeosil 165GR, Zeosil 175MP, and Hisil 233. Thus, Applicant disagrees with the Examiner's contention that Araki and Vasseur teach rubber compositions that are materially the same. The references also seek to improve entirely different tire properties through the use of their respective compositions in the tire. One of skill in the art would not assume compatibility between the tread rubber composition of Araki and the crown ply composition of Vasseur. Since these compositions cannot be combined, there is no suggestion or motivation in either Vasseur or Araki to combine or modify the references to arrive at the presently claimed method. Thus, there is no reasonable explanation of success.

The Cited Art Does Not Teach or Suggest All Claim Limitations

Moreover, even if there was a motivation to combine Vasseur and Araki, which applicant contends there is no such motivation, the combination of the cited references would not be sufficient to render claims 1-12 obvious. Neither Vasseur nor Araki disclose the use of a diene elastomer having at least one or more of its chain ends a functional group which is active for coupling to a reinforcing white filler. Because the combined references fail to teach or suggest all the claim limitations, the presently claimed method cannot be obvious over the cited prior art. Applicant respectfully requests withdrawal of the rejection of claims 1-12 under 35 U.S.C. § 103(a).

The Rejections of Remaining Claims Should Be Withdrawn

Claims 7 and 10 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Araki as evidenced by Micouin and in view of U.S. 5,674,932 to Agostini et al. ("Agostini"). The Examiner alleges that Araki disclose silica filler, but is silent on the CTAB value of silica. The Examiner also alleges that Araki and Agostini are analogous art since they both involve rubber compositions comprising silica filler. The Examiner further alleges that one of skill in the art would expect the silica disclosed by Agostini would function properly as filler in the Araki composition because one of skill in the art would expect all species of a known genus to work satisfactorily.

In response, Applicant submits that Araki as evidenced by Micouin in view of Agostini do not render the presently claimed invention obvious. Agostini teaches a process for preparing a silica-reinforced rubber composition for a tire tread containing a silica coupler. There is no

teaching or motivation provided in Agostini for producing a tire capable of delaying irregular tread wear on tires for heavy loads.

Furthermore, the combined references fail to teach or suggest all the claim limitations. As discussed above, Araki fails to teach a diene elastomer having at least one or more of its chain ends a functional group which is active for coupling to a reinforcing white filler. This deficiency is not supplied when Araki is combined with either Micouin or Agostini. Therefore, the combined art do not suggest or provide motivation for all claimed limitations of claims 7 and 10. Applicant requests withdrawal of the rejection of claims 7 and 10.

The Examiner has also rejected claims 4-5, and 10-12 under 35 U.S.C. § 103(a) as being unpatentable over Micouin in view of Araki. The Examiner acknowledges that Micouin fails to disclose a silanol group or polysiloxane block having a silanol end as the functional end group of diene elastomer. The Examiner alleges that Araki teach a diene copolymer that can be coupled at chain ends with a coupling agent containing silicon such as silicon tetrachloride or a coupling agent containing alkoxy silane. The Examiner alleges that it would have been obvious to one of ordinary skill in the art to use an end-group functionalized diene rubber made from a coupling agent containing silicon or alkoxy silane because when the diene rubbers are mixed with silica filler, a cross-linked composition can be obtained from the affinity and coupling between rubber and silica since both contact surfaces carry the same silanol endgroups.

In response, Applicant submits that it would not be obvious to one of skill in the art to use the endgroup-functionalized diene rubber made from a coupling agent containing silicon or coupling agent containing alkoxy silane as taught by Araki. In fact, there is no suggestion in either Araki or Micouin to combine the references. Micouin focuses on the use of a very specific

silica having a BET of between 185 and 250 m²/g and a CTAB of between 180 and 240 m²/g and is directed to obtaining tires having improved rolling resistance. Araki, however, is directed to a rubber composition for use in tires bearing heavy loads and is not limited to a specific type of silica. As discussed above, the rubber compositions disclosed in Micouin and Araki are not materially the same rubber composition. The references teach different types of silica, i.e. having contradictory specific surface area. Therefore, one of skill in the art would not combine the disclosures of Araki and Micouin. Since the problems addressed by Araki are so different from the problems addressed by Micouin, one of skill in the art would not be motivated to combine the references.

Even if the skilled artisan were to combine the disclosure of Araki with that of Micouin, the present invention is not obvious because the combination fails to disclose every limitation of the claims. Araki does not disclose a rubber composition comprising an elastomeric matrix comprising a diene elastomer having at one or more of its chain ends a functional group which is active for coupling to a reinforcing white filler. Micouin also fails to teach a diene elastomer having at one or more of its chain ends a functional group which is active for coupling to a reinforcing white filler. Therefore, the combination of Araki and Micouin does not render claims 4-5, and 10-12 unpatentable. Thus, Applicant respectfully requests withdrawal of the rejection of claims 4-5, and 10-12 under 35 U.S.C. § 103(a).

Claims 9 and 12 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Araki as evidenced by Micouin and in view of U.S. 5,989,719 to Loiselle. The Examiner alleges that the difference between the disclosure of Araki and the present invention is that Araki is silent on the use of alkyl alkoxy silane covering agent for silica, but discloses diene-based

polymers which are modified in the chain ends with coupling agents such as dialkyldialkoxysilanes, monoalkyltrialkoxysilanes or monoalkyltriaryloxy silanes. The Examiner alleges that Loiselle teaches a heat curable liquid silicone rubber composition comprising vinyl-containing polydiorganosiloxane and organohydrogensiloxane to improve hydrocarbon oil resistance. The Examiner alleges that using Araki's disclosure on modified diene-based polymer to modify the silica with the same alkylalkoxysilanes will improve the affinity with the Araki modified diene polymer and will result in an oil-resistant final product. The Examiner alleges that Araki and Loiselle are analogous art because they both involve rubber compositions having silica filler. The Examiner further alleges that it would be obvious to one of skill in the art to modify the rubber composition disclosed by Araki with an alkylalkoxysilane-modified silica using the same alkylalkoxysilanes disclosed to improve the affinity and processability between the polymer and silica and to obtain a better oil resistance as taught by Loiselle to arrive at the present invention.

In response, Applicant submits that Araki as evidenced by Micouin in view of Loiselle also do not render the presently claimed invention obvious. Loiselle discloses liquid silicone rubber compositions for use in gaskets and seals, not rubber compositions for use in tire treads. The cited references are not in analogous or related fields. One of skill in the art of tire treads would not look to a reference concerning seals and gaskets. Thus, there would be no motivation to modify the Araki composition by using the alkyalkoxysilane modified silica of Loiselle.

In addition, the combined references fail to teach or suggest all the claim limitations. Even if the skilled artisan combined the disclosures of Araki, Micouin, and Loiselle, they do not teach a diene elastomer having at least one or more of its chain ends a functional group which is

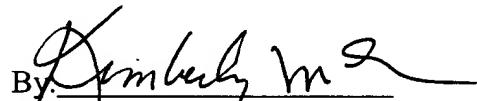
active for coupling to a reinforcing white filler. Therefore, the combined art fail to render claims 9 and 12 obvious over the present invention and Applicant respectfully requests withdrawal of the rejection of claims 9 and 12.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully requests withdrawal of the outstanding rejections and allowance of the pending claims.

Applicant requests a three month extension of time and encloses herewith the requisite fee as set forth in 37 C.F.R. § 1.17(a)(3). Applicant does not believe that any additional fee is required in connection with the submission of this document. However, should any fee be required, or if any overpayment has been made, the Commissioner is hereby authorized to charge any fees, or credit or any overpayments made, to Deposit Account 02-4377. A duplicate copy of this sheet is enclosed.

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